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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/560,515	08/17/2007	**Animesh Jha**	5129.603	6376

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EXAMINER	
TAKEUCHI, YOSHITOSHI	
ART UNIT	PAPER NUMBER
1735	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/560,515	JHA ET AL.	
	Examiner	Art Unit	
	YOSHITOSHI TAKEUCHI	1735	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) *26-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25 and 34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-34 are presented for examination, wherein claims 26-33 are withdrawn as non-elected.

Election/Restrictions

2. Claims 26-33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on September 10, 2010.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim **34** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The use of a parenthetical is improper within a claim, making the meaning indefinite since it is unclear whether the limitation within the parenthetical is required or not. For purposes of examination, the examiner treats "(illmenite/bauxite/clay)" as being optional and not required. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-5, 8-10, 12-13, 18, and 20 are rejected under 35 U.S.C. 102(b) as anticipated by over Horvath et al (US 3,876,749).

a. Regarding claim **1**, Horvath teaches a method for reducing the red mud byproduct (abstract and 3:66-67, which includes aluminaferrous and titaniferrous mixtures) of the Bayer process of aluminum manufacturing, recovering aluminate (abstract) comprising: (A) smelting the mixture in the presence of a reducing agent to produce a molten slag (3:37-47); (B) adding burnt lime to the slag (1:53, an alkali); (C) isolating molten iron from the molten slag to produce a residual slag (3:56-58); and (D) recovering the metal oxide from the residual slag (3:64-4:57, more particularly 4:55-57, wherein the slag is separated and further treated and ultimately recycled back into the Bayer process to form alumina, a metal oxide).

b. Regarding claim **2**, Horvath teaches the method of claim 1, wherein the titaniferrous mixture is optional. Therefore, this claim is met since Horvath teaches the aluminaferrous mixture of claim 1 (see supra). In the alternative, aluminum is formed from bauxite using the Bayer process (1:10-11) and the red mud byproduct is refined (1:46-47) and reintroduced into the Bayer process (5:54-55). Moreover, Perovskite is formed during the process (3:28), of which at least some would be reintroduced into the Bayer process, and would be part of the titaniferrous mixture from which at least one metal oxide would be recovered.

c. Regarding claim **3-4**, Horvath teaches the method of claim 1, wherein the aluminaferrous mixture is bauxite (1:11, an aluminum ore) or red mud (1:46-47).

d. Regarding claims **5**, Horvath teaches the method of claim 1, wherein Horvath teaches recovering alumina in the final form of aluminum (4:54-57, wherein aluminate liquor are reintroduced into the Bayer process, which ultimately forms aluminum) and Fe_20_3, which is ultimately recovered as steel (3:66, wherein Fe_2O_3 must be formed or the molar ratio would be meaningless, 3:46-47, wherein if 80-90% of iron oxide is converted to iron, then 10-20% of iron oxide remains in the slag, and 3:55-57, wherein at lease some of the iron oxide will be reintroduced into the Bayer process).

e. Regarding claim **8**, Horvath teaches the method of claim 1, wherein in step (A) substantially the whole of the iron present in the titaniferrous or aluminaferrous mixture is reduced to molten metallic iron in the molten slag (3:45-37, wherein 80-90% of iron oxide in the red mud is converted to metallic iron).

f. Regarding claim **9**, Horvath teaches the method of claim 8, wherein the molten metallic iron is steel (3:56).

g. Regarding claims **10** Horvath in view of Jha teaches the method of claim 9, wherein Jha teaches step (A) includes molten iron in the bath Fe_20_3, which is ultimately recovered as steel (3:66, wherein Fe_2O_3 must be formed or the molar ratio would be meaningless, 3:46-47, wherein if 80-90% of iron oxide is converted to iron, then 10-20% of iron oxide remains in the slag, and 3:55-57, wherein at lease some of the iron oxide will be reintroduced into the Bayer process)

The "cast" limitation of "molten cast iron bath" does not patentably distinguish molten iron, since the molten cast iron bath is a product by process limitation--i.e. the process of making a molten iron bath is by casting the iron.

The limitation labeling the molten cast iron as a reducing agent does not patentably distinguish the instant invention from the prior art.

a. Regarding claim **12**, Horvath teaches the method of claim 1, wherein the reducing agent comprises a source of carbon (3:41, anthracite, which being a form of coal is a source of carbon).

b. Regarding claim **13**, Horvath teaches the method of claim 1, wherein step (A) comprises smelting the mixture in the presence of reducing agent (3:38-39) and lime (1:47-52).

c. Regarding claim **18**, Horvath teaches the method of claim 1, wherein in step (C), the molten iron and residual slag are tapped separately (3:55-57).

d. Regarding claim **20**, Horvath teaches the method of claim 1, wherein step (D) comprises: (D1) adding to the residual slag an aqueous solution (4:13-15); (D2) separating a metallate solution from a metallate residue (4:15, filtration; and (D3) isolating the metal oxide from the metallate solution and/or from the metallate residue (4:16-17, wherein metal oxide will be separated).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject

matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horvath et al (US 3,876,749).

e. Regarding claim **11**, Horvath teaches the method of claim 9 as provided supra, wherein a steel melt is taught, but does not expressly teach "the metallic iron is 0.8 to 1.0% C steel." However, since Horvath discloses substantially the same composition made by substantially the same process (i.e. recovery of steel from molten red mud by

adding a reducing agent and burnt lime), the resulting steel being "0.8 to 1.0% C steel" would be expected. MPEP § 2112.01(I).

f. Regarding claim **19**, Horvath teaches the method of claim 18 as provided supra, but does not expressly teach "during tapping of residual slag, alkali is added by dosing." However, a person of ordinary skill in the art would understand that adding the alkali in doses, rather than all at once may lead to reduced costs and improved uniformity of the reaction. As a result, it would have been obvious to a person of ordinary skill at the time of the invention to add the alkali in the Horvath method by doses, in order to potentially reduce costs and improve uniformity of the reaction.

9. Claims 1, 6-7, 11, 14-17, 19-25 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horvath et al (US 3,876,749) in view of Jha (WO 02/10068).

a. Claim 1 is being rejected in the alternative in order to address dependent claims 6-7, 14-17, 20-25 and 34. Regarding claim 1, Horvath teaches a method for reducing the red mud byproduct (abstract and 3:66, which includes aluminaferrous and titaniferrous mixtures) of the Bayer process of aluminum manufacturing, recovering aluminate (abstract) comprising: (A) smelting the mixture in the presence of a reducing agent to produce a molten slag (3:37-47); (B) adding burnt lime to the slag (53, calcium oxide, an alkali); (C) isolating molten iron from the molten slag to produce a residual slag (3:56-58); and (D) recovering the metal oxide from the residual slag (3:64-4:57, more particularly 4:55-57, wherein the slag is separated and further treated and ultimately recycled back into the Bayer process to form alumina).

In the alternative for step (D), Horvath teaches the Bayer process can be performed either by heating the bauxite with concentrated caustic soda or by melting (1:10-14). Harvath teaches after separating the steel and molten slag (3:54-56), to chemically and mechanically treat the slag to form a slurry (3:3:57-4:12) to form as slurry, which is leached, washed and filtered (4:6-15), wherein the solution contains aluminate (4:55).

Jha teaches recovering alumina from bauxite ore using the Bayer's process through the use of caustic soda (Figure 11 and 2: 6-14, wherein NaOH is also known as caustic soda) and further explains that complete recovery of alumina is not economically possible by the Bayer process (2:13-15). The solid filter residue byproduct of the Bayer process, known as "red mud," is a substantial environmental hazard (3:2-8). Jha teaches a method of recovering residual alumina at 98% efficiency and titanium dioxide from the red mud byproduct (4:8-10 and 8:24-29). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to treat the slurry of Horvath in the manner taught by Jha in order to extract the residual alumina at 98% efficiency and titanium dioxide from the residual byproduct, as taught by Jha (8:24-29).

b. Regarding claims **6**, Horvath in view of Jha teaches the method of claim 1, wherein Jha teaches the precipitation of aluminum hydroxide is an intermediate product of extracting residual alumina from the aluminate byproduct (9:7-12).

c. Regarding claims **7** Horvath in view of Jha teaches the method of claim 1, wherein Jha teaches "the at least one metal oxide is at least two metal oxides being TiO_2 and $A1_20_3$" (8:24-29).

d. In the alternative, regarding claim **11**, Horvath in view of Jha teaches the method of claim 9 as provided supra, wherein Horvath teaches a steel melt is taught, but does not expressly teach "the metallic iron is 0.8 to 1.0% C steel." However, since Horvath discloses substantially the same composition made by substantially the same process (i.e. recovery of steel from molten red mud by adding a reducing agent and burnt lime), the resulting steel being "0.8 to 1.0% C steel" would be expected. MPEP § 2112.01(I).

e. Regarding claim **14**, Horvath in view of Jha teaches the method of claim 1, wherein Jha teaches roasting the byproduct with sodium carbonate in air (8-10, wherein the alkali is a carbonate).

f. Regarding claim **15**, Horvath in view of Jha teaches the method of claim 14, wherein Jha teaches roasting the byproduct with sodium carbonate in air (8-10, wherein the carbonate is a Group I metal, sodium).

g. Regarding claim **16**, Horvath in view of Jha teaches the method of claim 14, wherein Jha teaches roasting the byproduct with sodium carbonate in air (8-10, wherein the carbonate is sodium carbonate).

h. Regarding claim **17**, Horvath teaches the method of claim 1 as provided supra, wherein step (A) comprises smelting the mixture in alkali (7:5, burnt lime) and in the presence of up to 50% by stoichiometric proportion (1:50, wherein burnt lime is mixed in 0.4-1.5 wt% of slag, which overlaps the instantly claimed range of up to 50 wt% of mixture), but does not expressly teach the "titaniferrous mixture is ilmenite." However, a titaniferrous mixture is merely optional in claim 1, therefore is ilmenite is not required in claim 17.

In addition, the examiner takes official notice that ilmenite and bauxite naturally occur together, so the bauxite of claim 1 would be expected to include some ilmenite and treatment of bauxite would be expected to result in treatment of ilmenite.

i. In the alternative, regarding claim **20**, Horvath in view of Jha teaches the method of claim 1, wherein Horvath teaches the method of claim 1, wherein step (D) comprises: (D1) adding to the residual slag an aqueous solution (4:13-15); (D2) separating a metallate solution from a metallate residue (4:15, filtration), as provided supra. However, in the alternative, Jha teaches (D3) isolating the metal oxide from the metallate solution and/or from the metallate residue (Figure 11).

j. In the alternative, regarding claim **19**, Horvath in view of Jha teaches the method of claim 18, but does not expressly teach "during tapping of residual slag, alkali is added by dosing." However, a person of ordinary skill in the art would understand that adding the alkali in doses, rather than all at once may lead to reduced costs and improved uniformity of the reaction. As a result, it would have been obvious to a person of ordinary skill at the time of the invention to add the alkali in the Horvath method by doses, in order to potentially reduce costs and improve uniformity of the reaction.

k. Regarding claim **21**, Horvath in view of Jha teaches the method of claim 20, wherein Jha teaches step (D3a) precipitating metal hydroxide from the metallate solution (9:7-12).

l. Regarding claim **22**, Horvath in view of Jha teaches the method of claim 21, wherein Jha teaches step (D3a) includes: bubbling CO_2 gas through the metallate solution (9:7-12).

m. Regarding claim **23**, Horvath in view of Jha teaches the method of claim 22, wherein Jha teaches CO_2 gas is generated during step (A) (7:5).

n. Regarding claim **24**, Horvath in view of Jha teaches the method of claim 20, wherein Jha teaches step (D3) comprises: (D3b) acid leaching the metallate residue to produce an acid leachate; (D3c) selectively precipitating from the acid leachate a hydrated salt of the metal oxide; and (D3d) converting the hydrated salt into the metal oxide (10:27-31).

o. Regarding claim **25**, Horvath in view of Jha teaches the method of claim 24, wherein Jha teaches in step (D3b): (D3bl) acidifying the metallate residue to produce a slurry (11:4-5); (D3b2) hydrolyzing the slurry (11:7); and (D3b3) separating the metallate solution from an insoluble residue (11:11-12).

p. Regarding independent claim **34**, Horvath teaches a method for extracting alumina comprising the steps of: (i) reducing bauxite (a mineral ore) and red mud (alumina-containing residue) in a bath with molten iron (the "cast" limitation of "molten cast iron bath" does not patentably distinguish molten iron, since the molten cast iron bath is a product by process limitation--i.e. the process of making a molten iron bath is by casting the iron) followed by treatment with an alkali and/or alkali mixture (1:48-52, wherein the alkali mixture is burnt lime); (ii) Extracting the desired metal salt in the slag produced in step (i) using an aqueous and/or a dilute ammoniacal solution in aqueous media to separate water-soluble alkali aluminate from undigested metal oxide filter residue (4:4-19).

Horvath does not expressly teach the steps of "(iii) Precipitation of aluminum hydroxide from alkali aluminate solution by bubbling CO2 gas or oxalic acid medium for maintaining a constant pH; (iv) Calcining aluminum hydroxide formed in step (iii); (v) Acidifying the metal oxide filter residue salt to produce a hydrated salt; and (vi) converting the hydrated salt into an appropriate oxide."

Jha teaches recovering alumina from bauxite ore using the Bayer's process through the use of caustic soda (Figure 11 and 2: 6-14, wherein NaOH is also known as caustic soda) and further explains that complete recovery of alumina is not economically possible by the Bayer process (2:13-15). The solid filter residue byproduct of the Bayer process, known as "red mud," is a substantial environmental hazard (3:2-8). Jha teaches a method of recovering residual alumina at 98% efficiency and titanium dioxide from the red mud byproduct (4:8-10 and 8:24-29).

As a result, it would have been obvious to a person of ordinary skill at the time of the invention to treat the slurry of Horvath in the manner taught by Jha in order to extract the residual alumina at 98% efficiency and titanium dioxide from the residual byproduct, as taught by Jha (8:24-29).

Jha teaches the step (iii) precipitating aluminum hydroxide from alkali aluminate solution by bubbling CO2 gas or oxalic acid medium (5:4, the limitation "for maintaining a constant pH" is treated as intended use and does not patentably distinguish the instant invention from the art); (iv) Calcining aluminum hydroxide formed in step (iii) (7:23); and (v) of acid leaching the metallate residue to produce an acid leachate; selectively

precipitating from the acid leachate a hydrated salt of the metal oxide; and (vi) converting the hydrated salt into the metal oxide (10:27-31).

The "cast" limitation of "molten cast iron bath" does not patentably distinguish molten iron, since the molten cast iron bath is a product by process limitation--i.e. the process of making a molten iron bath is by casting the iron.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YOSHITOSHI TAKEUCHI whose telephone number is (571) 270-5828. The examiner can normally be reached on Monday-Thursday 9:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica L. Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 1735

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